expansionary phase of the business cycle ended. Recovery and economic expansion resumed in 2002 and picked up considerable strength over the next couple of years so that the economy was again operating at full employment by late 2004. Full employment continued through 2007.

We will say more about recession and expansion later. Our immediate focus is the terminology in the Greenspan quotation, which is precisely the language of the **aggregate demand–aggregate supply model (AD-AS model).** The AD-AS model—the subject of this chapter—enables us to analyze changes in real GDP and the price level simultaneously. The AD-AS model thus provides keen insights on inflation, recession, and unemployment. In later chapters, we will see that it also nicely depicts macroeconomic stabilization policies, such as those used in 2008 to try to prevent recession.

Aggregate Demand

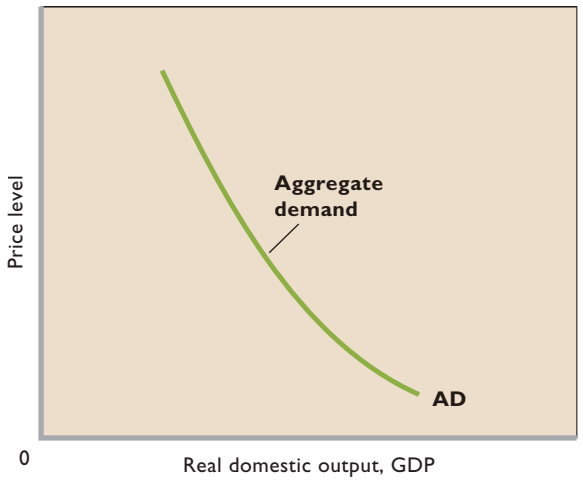
Aggregate demand is a schedule or curve that shows the amounts of real output (real GDP) that buyers collectively desire to purchase at each possible price level. The relationship between the price level (as measured by the GDP price index) and the amount of real GDP demanded is inverse or negative: When the price level rises, the quantity of real GDP demanded decreases; when the price level falls, the quantity of real GDP demanded increases.

Aggregate Demand Curve

The inverse relationship between the price level and real GDP is shown in Figure 29.1, where the aggregate demand curve AD slopes downward, as does the demand curve for an individual product.

Why the downward slope? The explanation is *not* the same as that for why the demand for a single product slopes downward. That explanation centered on the income effect and the substitution effect. When the price of an *individual* product falls, the consumer's (constant) nominal income allows a larger purchase of the product (the income effect). And, as price falls, the consumer wants to buy more of the product because it becomes relatively less expensive than other goods (the substitution effect).

FIGURE 29.1 The aggregate demand curve. The downsloping aggregate demand curve AD indicates an inverse (or negative) relationship between the price level and the amount of real output purchased.



But these explanations do not work for aggregates. In Figure 29.1, when the economy moves down its aggregate demand curve, it moves to a lower general price level. But our circular flow model tells us that when consumers pay lower prices for goods and services, less nominal income flows to resource suppliers in the form of wages, rents, interest, and profits. As a result, a decline in the price level does not necessarily mean an increase in the nominal income of the economy as a whole. Thus, a decline in the price level need not produce an income effect, where more output is purchased because lower nominal prices leave buyers with greater real income.

Similarly, in Figure 29.1, prices in general are falling as we move down the aggregate demand curve, so the rationale for the substitution effect (where more of a specific product is purchased because it becomes cheaper relative to all other products) is not applicable. There is no *overall* substitution effect among domestically produced goods when the price level falls.

If the conventional substitution and income effects do not explain the downward slope of the aggregate demand curve, what does? The explanation rests on three effects of a price-level change.

Real-Balances Effect

A change in the price level produces a **real-balances effect.** Here is how it works: A higher price level reduces the real value or purchasing power of the public's accumulated savings balances. In particular, the real value of assets with fixed money values, such as savings accounts or bonds, diminishes. Because a higher price level erodes the purchasing power of such assets, the

ORIGIN OF THE IDEA
O 29.1
Real-balances effect

public is poorer in real terms and will reduce its spending. A household might buy a new car or a plasma TV if the purchasing power of its financial asset balances is, say, $50,000. But if inflation erodes the purchasing power of its asset balances to $30,000, the household may defer its purchase. So a higher price level means less consumption spending.

Interest-Rate Effect The aggregate demand curve also slopes downward because of the **interest-rate effect.** When we draw an aggregate demand curve, we assume that the supply of money in the economy is fixed. But when the price level rises, consumers need more money for purchases and businesses need more money to meet their payrolls and to buy other resources. A $10 bill will do when the price of an item is $10, but a $10 bill plus a $1 bill is needed when the item costs $11. In short, a higher price level increases the demand for money. So, given a fixed supply of money, an increase in money demand will drive up the price paid for its use. That price is the interest rate.

Higher interest rates curtail investment spending and interest-sensitive consumption spending. Firms that expect a 6 percent rate of return on a potential purchase of capital will find that investment potentially profitable when the interest rate is, say, 5 percent. But the investment will be unprofitable and will not be made when the interest rate has risen to 7 percent. Similarly, consumers may decide not to purchase a new house or new automobile when the interest rate on loans goes up. So, by increasing the demand for money and consequently the interest rate, a higher price level reduces the amount of real output demanded.

Foreign Purchases Effect The final reason why the aggregate demand curve slopes downward is the **foreign purchases effect.** When the U.S. price level rises relative to foreign price levels (and exchange rates do not respond quickly or completely), foreigners buy fewer U.S. goods and Americans buy more foreign goods. Therefore, U.S. exports fall and U.S. imports rise. In short, the rise in the price level reduces the quantity of U.S. goods demanded as net exports.

These three effects, of course, work in the opposite direction for a decline in the price level. A decline in the price level increases consumption through the real-balances effect and interest-rate effect; increases investment through the interest-rate effect; and raises net exports by increasing exports and decreasing imports through the foreign purchases effect.

Changes in Aggregate Demand

Other things equal, a change in the price level will change the amount of aggregate spending and therefore change the amount of real GDP demanded by the economy. Movements along a fixed aggregate demand curve represent these changes in real GDP. However, if one or more of those "other things" change, the entire aggregate demand curve will shift. We call these other things **determinants of aggregate demand** or, less formally, *aggregate demand shifters.* They are listed in Figure 29.2.

Changes in aggregate demand involve two components:

- A change in one of the determinants of aggregate demand that directly changes the amount of real GDP demanded.
- A multiplier effect that produces a greater ultimate change in aggregate demand than the initiating change in spending.

In Figure 29.2, the full rightward shift of the curve from AD_1 to AD_2 shows an increase in aggregate demand, separated into these two components. The horizontal distance between AD_1 and the broken curve to its right illustrates an initial increase in spending, say, $5 billion of added investment. If the economy's MPC is .75, for example, then the simple multiplier is 4. So the aggregate demand curve shifts rightward from AD_1 to AD_2—four times the distance between AD_1 and the broken line. The multiplier process magnifies the initial change in spending into successive rounds of new consumption spending. After the shift, $20 billion (= $5 × 4) of additional real goods and services are demanded at each price level.

Similarly, the leftward shift of the curve from AD_1 to AD_3 shows a decrease in aggregate demand, the lesser amount of real GDP demanded at each price level. It also involves the initial decline in spending (shown as the horizontal distance between AD_1 and the dashed line to its left), followed by multiplied declines in consumption spending and the ultimate leftward shift to AD_3.

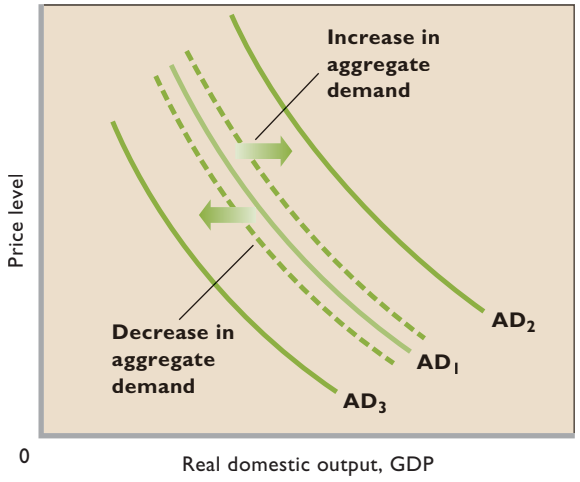
Let's examine each of the determinants of aggregate demand listed in Figure 29.2.

Consumer Spending

Even when the U.S. price level is constant, domestic consumers may alter their purchases of U.S.-produced real output. If those consumers decide to buy more output at each price level, the aggregate demand curve will shift to the right, as from AD_1 to AD_2 in Figure 29.2. If they decide to buy less output, the aggregate demand curve will shift to the left, as from AD_1 to AD_3.

Several factors other than a change in the price level may change consumer spending and therefore shift the

FIGURE 29.2 Changes in aggregate demand. A change in one or more of the listed determinants of aggregate demand will shift the aggregate demand curve. The rightward shift from AD_1 to AD_2 represents an increase in aggregate demand; the leftward shift from AD_1 to AD_3 shows a decrease in aggregate demand. The vertical distances between AD_1 and the dashed lines represent the initial changes in spending. Through the multiplier effect, that spending produces the full shifts of the curves.



Determinants of Aggregate Demand: Factors That Shift the Aggregate Demand Curve

1. Change in consumer spending
   a. Consumer wealth
   b. Consumer expectations
   c. Household borrowing
   d. Taxes
2. Change in investment spending
   a. Interest rates
   b. Expected returns
      - Expected future business conditions
      - Technology
      - Degree of excess capacity
      - Business taxes
3. Change in government spending
4. Change in net export spending
   a. National income abroad
   b. Exchange rates

aggregate demand curve. As Figure 29.2 shows, those factors are real consumer wealth, consumer expectations, household debt, and taxes. Because our discussion here parallels that of Chapter 27, we will be brief.

Consumer Wealth Consumer wealth is the total dollar value of all assets owned by consumers in the economy less the dollar value of their liabilities (debts). Assets include stocks, bonds, and real estate. Liabilities include mortgages, car loans, and credit card balances.

Consumer wealth sometimes changes suddenly and unexpectedly due to surprising changes in asset values. An unforeseen increase in the stock market is a good example. The increase in wealth prompts pleasantly surprised consumers to save less and buy more out of their current incomes than they had previously been planning. The resulting increase in consumer spending—the so-called *wealth effect*—shifts the aggregate demand curve to the right. In contrast, an unexpected decline in asset values will cause an unanticipated reduction in consumer wealth at each price level. As consumers tighten their belts in response to the bad news, a "reverse wealth effect" sets in. Unpleasantly surprised consumers increase savings and reduce consumption, thereby shifting the aggregate demand curve to the left.

Household Borrowing Consumers can increase their consumption spending by borrowing. Doing so shifts the aggregate demand curve to the right. By contrast, a decrease in borrowing for consumption purposes shifts the aggregate demand curve to the left. The aggregate demand curve will also shift to the left if consumers increase their savings rates in order to pay off their debts. With more money flowing to debt repayment, consumption expenditures decline and the AD curve shifts left.

Consumer Expectations Changes in expectations about the future may alter consumer spending. When people expect their future real incomes to rise, they tend to spend more of their current incomes. Thus, current consumption spending increases (current saving falls) and the aggregate demand curve shifts to the right. Similarly, a widely held expectation of surging inflation in the near future may increase aggregate demand today because consumers will want to buy products before their prices escalate. Conversely, expectations of lower future income or lower future prices may reduce current consumption and shift the aggregate demand curve to the left.

Personal Taxes A reduction in personal income tax rates raises take-home income and increases consumer purchases at each possible price level. Tax cuts shift the aggregate demand curve to the right. Tax increases reduce consumption spending and shift the curve to the left.

Investment Spending

Investment spending (the purchase of capital goods) is a second major determinant of aggregate demand. A decline in investment spending at each price level will shift the aggregate demand curve to the left. An increase in investment spending will shift it to the right. In Chapter 27 we saw that investment spending depends on the real interest rate and the expected return from investment.

Real Interest Rates Other things equal, an increase in real interest rates will lower investment spending and reduce aggregate demand. We are not referring here to the "interest-rate effect" that results from a change in the price level. Instead, we are identifying a change in the real interest rate resulting from, say, a change in a nation's money supply. An increase in the money supply lowers the interest rate, thereby increasing investment and aggregate demand. A decrease in the money supply raises the interest rate, reducing investment and decreasing aggregate demand.

Expected Returns Higher expected returns on investment projects will increase the demand for capital goods and shift the aggregate demand curve to the right. Alternatively, declines in expected returns will decrease investment and shift the curve to the left. Expected returns, in turn, are influenced by several factors:

- ***Expectations about future business conditions*** If firms are optimistic about future business conditions, they are more likely to forecast high rates of return on current investment and therefore may invest more today. On the other hand, if they think the economy will deteriorate in the future, they will forecast low rates of return and perhaps will invest less today.
- ***Technology*** New and improved technologies enhance expected returns on investment and thus increase aggregate demand. For example, recent advances in microbiology have motivated pharmaceutical companies to establish new labs and production facilities.
- ***Degree of excess capacity*** A rise in excess capacity—unused capital—will reduce the expected return on new investment and hence decrease aggregate demand. Other things equal, firms operating factories at well below capacity have little incentive to build new factories. But when firms discover that their excess capacity is dwindling or has completely disappeared, their expected returns on new investment in factories and capital equipment rise. Thus, they increase their investment spending, and the aggregate demand curve shifts to the right.
- ***Business taxes*** An increase in business taxes will reduce after-tax profits from capital investment and lower expected returns. So investment and aggregate demand will decline. A decrease in business taxes will have the opposite effects.

The variability of interest rates and expected returns makes investment highly volatile. In contrast to consumption, investment spending rises and falls often, independent of changes in total income. Investment, in fact, is the least stable component of aggregate demand.

Government Spending

Government purchases are the third determinant of aggregate demand. An increase in government purchases (for example, more military equipment) will shift the aggregate demand curve to the right, as long as tax collections and interest rates do not change as a result. In contrast, a reduction in government spending (for example, fewer transportation projects) will shift the curve to the left.

Net Export Spending

The final determinant of aggregate demand is net export spending. Other things equal, higher U.S. *exports* mean an increased foreign demand for U.S. goods. So a rise in net exports (higher exports relative to imports) shifts the aggregate demand curve to the right. In contrast, a decrease in U.S. net exports shifts the aggregate demand curve leftward. (These changes in net exports are *not* those prompted by a change in the U.S. price level—those associated with the foreign purchases effect. The changes here are shifts of the AD curve, not movements along the AD curve.)

What might cause net exports to change, other than the price level? Two possibilities are changes in national income abroad and changes in exchange rates.

National Income Abroad Rising national income abroad encourages foreigners to buy more products, some of which are made in the United States. U.S. net exports thus rise, and the U.S. aggregate demand curve shifts to the right. Declines in national income abroad do the opposite: They reduce U.S. net exports and shift the U.S. aggregate demand curve to the left.

Exchange Rates Changes in the dollar's exchange rate—the price of foreign currencies in terms of the U.S. dollar—may affect U.S. exports and therefore aggregate demand. Suppose the dollar depreciates in terms of the euro (meaning the euro appreciates in terms of the dollar). The new, relatively lower value of dollars and higher value of euros enables European consumers to obtain more dollars

with each euro. From their perspective, U.S. goods are now less expensive; it takes fewer euros to obtain them. So European consumers buy more U.S. goods, and U.S. exports rise. But American consumers can now obtain fewer euros for each dollar. Because they must pay more dollars to buy European goods, Americans reduce their imports. U.S. exports rise and U.S. imports fall. Conclusion: Dollar depreciation increases net exports (imports go down; exports go up) and therefore increases aggregate demand.

Dollar appreciation has the opposite effects: Net exports fall (imports go up; exports go down) and aggregate demand declines.

QUICK REVIEW 29.1

- Aggregate demand reflects an inverse relationship between the price level and the amount of real output demanded.
- Changes in the price level create real-balances, interest-rate, and foreign purchases effects that explain the downward slope of the aggregate demand curve.
- Changes in one or more of the determinants of aggregate demand (Figure 29.2) alter the amounts of real GDP demanded at each price level; they shift the aggregate demand curve. The multiplier effect magnifies initial changes in spending into larger changes in aggregate demand.
- An increase in aggregate demand is shown as a rightward shift of the aggregate demand curve; a decrease, as a leftward shift of the curve.

Aggregate Supply

Aggregate supply is a schedule or curve showing the relationship between the price level and the amount of real domestic output that firms in the economy produce. This relationship varies depending on the time horizon and how quickly output prices and input prices can change. We will define three time horizons:

- In the *immediate short run*, both input prices as well as output prices are fixed.
- In the *short run*, input prices are fixed, but output prices can vary.
- In the *long run*, input prices as well as output prices can vary.

In Chapter 23, we discussed both the immediate short run and the long run in terms of how an automobile maker named Buzzer Auto responds to changes in the demand for its new car, the Prion. Here we extend the logic of that chapter to the economy as a whole in order to discuss how total output varies with the price level in the immediate short run, the short run, and the long run. As you will see, the relationship between the price level and total output is different in each of the three time horizons because input prices are stickier than output prices. While both become more flexible as time passes, output prices usually adjust more rapidly.

Aggregate Supply in the Immediate Short Run

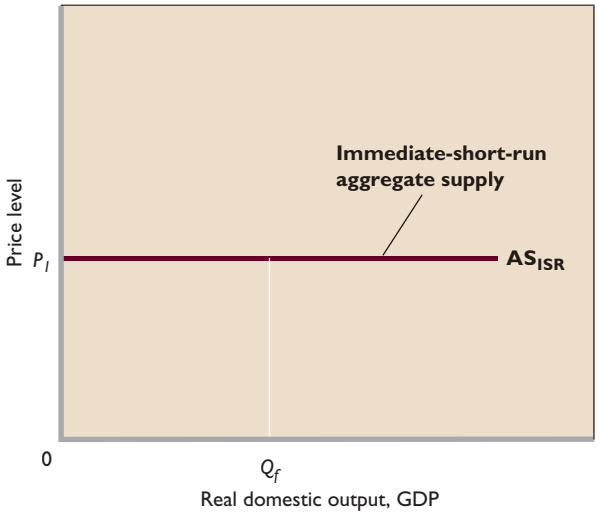
Depending on the type of firm, the immediate short run can last anywhere from a few days to a few months. It lasts as long as *both* input prices and output prices stay fixed. Input prices are fixed in both the immediate short run and the short run by contractual agreements. In particular, 75 percent of the average firm's costs are wages and salaries—and these are almost always fixed by labor contracts for months or years at a time. As a result, they are usually fixed for a much longer duration than output prices, which can begin to change within a few days or a few months depending upon the type of firm.

That being said, output prices are also typically fixed in the immediate short run. This is most often caused by firms setting fixed prices for their customers and then agreeing to supply whatever quantity demanded results at those fixed prices. For instance, once an appliance manufacturer sets its annual list prices for refrigerators, stoves, ovens, and microwaves, it is obligated to supply however many or few appliances customers want to buy at those prices. Similarly, a catalogue company is obliged to sell however much customers want to buy of its products at the prices listed in its current catalogue. And it is obligated to supply those quantities demanded until it sends out its next catalogue.

With output prices fixed and firms selling however much customers want to purchase at those fixed prices, the **immediate-short-run aggregate supply curve** AS_{ISR} is a horizontal line, as shown in Figure 29.3. The AS_{ISR} curve is horizontal at the overall price level P_1, which is calculated from all of the individual prices set by the various firms in the economy. Its horizontal shape implies that the total amount of output supplied in the economy depends directly on the volume of spending that results at price level P_1. If total spending is low at price level P_1, firms will supply a small amount to match the low level of spending. If total spending is high at price level P_1, they will supply a high level of output to match the high level of spending. The amount of output that results may be higher than or lower than the economy's full-employment output level Q_f.

Notice, however, that firms will respond in this manner to changes in total spending only as long as output

FIGURE 29.3 Aggregate supply in the immediate short run. In the immediate short run, the aggregate supply curve AS_{ISR} is horizontal at the economy's current price level, P_1. With output prices fixed, firms collectively supply the level of output that is demanded at those prices.



prices remain fixed. As soon as firms are able to change their product prices, they can respond to changes in aggregate spending not only by increasing or decreasing output but also by raising or lowering prices. This is the situation that leads to the upward-sloping short-run aggregate supply curve that we discuss next.

Aggregate Supply in the Short Run

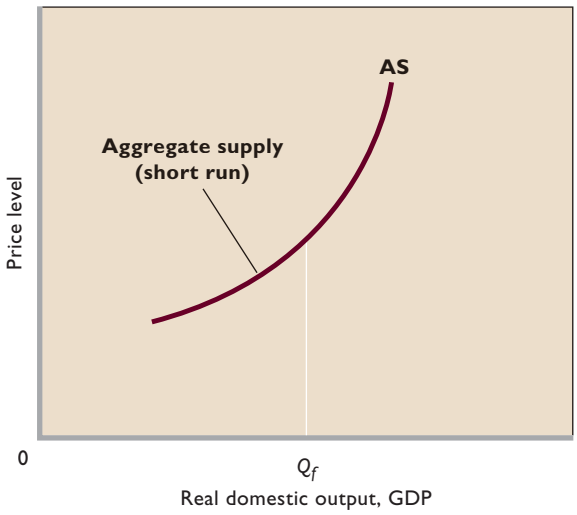
The short run begins after the immediate short run ends. As it relates to macroeconomics, the short run is a period of time during which output prices are flexible, but input prices are either totally fixed or highly inflexible.

These assumptions about output prices and input prices are general—they relate to the economy in the aggregate. Naturally, some input prices are more flexible than others. Since gasoline prices are quite flexible, a package delivery firm like UPS that uses gasoline as an input will have at least one very flexible input price. On the other hand, wages at UPS are set by five-year labor contracts negotiated with its drivers' union, the Teamsters. Because wages are the firm's largest and most important input cost, it is the case that, overall, UPS faces input prices that are inflexible for several years at a time. Thus, its "short run"—during which it can change the shipping prices that it charges its customers but during which it must deal with substantially fixed input prices—is actually quite long. Keep this in mind as we derive the short-run aggregate supply for the entire economy. Its applicability does not depend on some arbitrary definition of how long the "short run" should be. Instead, the short-run for which the model is relevant is any period of time during which output prices are flexible, but input prices are fixed or nearly fixed.

As illustrated in Figure 29.4, the **short-run aggregate supply curve** AS slopes upward because, with input prices fixed, changes in the price level will raise or lower real firm profits. To see how this works, consider an economy that has only a single multiproduct firm called Mega Buzzer and in which the firm's owners must receive a real profit of $20 in order to produce the full-employment output of 100 units. Assume the owner's only input (aside from entrepreneurial talent) is 10 units of hired labor at $8 per worker, for a total wage cost of $80. Also, assume that the 100 units of output sell for $1 per unit, so total revenue is $100. Mega Buzzer's nominal profit is $20 (= $100 − $80), and using the $1 price to designate the base-price index of 100, its real profit is also $20 (= $20/1.00). Well and good; the full-employment output is produced.

Next consider what will happen if the price of Mega Buzzer's output doubles. The doubling of the price level will boost total revenue from $100 to $200, but since we are discussing the short run during which input prices are fixed, the $8 nominal wage for each of the 10 workers will remain unchanged so that total costs stay at $80. Nominal profit will rise from $20 (= $100 − $80) to

FIGURE 29.4 The aggregate supply curve (short run). The upsloping aggregate supply curve AS indicates a direct (or positive) relationship between the price level and the amount of real output that firms will offer for sale. The AS curve is relatively flat below the full-employment output because unemployed resources and unused capacity allow firms to respond to price-level rises with large increases in real output. It is relatively steep beyond the full-employment output because resource shortages and capacity limitations make it difficult to expand real output as the price level rises.



$120 (= $200 − $80). Dividing that $120 profit by the new price index of 200 (= 2.0 in hundredths), we find that Mega Buzzer's real profit is now $60. The rise in the real reward from $20 to $60 prompts the firm (economy) to produce more output. Conversely, price-level declines reduce real profits and cause the firm (economy) to reduce its output. So, in the short run, there is a direct, or positive, relationship between the price level and real output. When the price level rises, real output rises and when the price level falls, real output falls. The result is an upward-sloping short-run aggregate supply curve.

Notice, however, that the slope of the short-run aggregate supply curve is not constant. It is relatively flat at outputs below the full-employment output level Q_f and relatively steep at outputs above it. This has to do with the fact that per-unit production costs underlie the short-run aggregate supply curve. Recall from Chapter 26 that

$$\text{Per-unit production cost} = \frac{\text{total input cost}}{\text{units of output}}$$

The per-unit production cost of any specific level of output establishes that output's price level because the associated price level must cover all the costs of production, including profit "costs."

As the economy expands in the short run, per-unit production costs generally rise because of reduced efficiency. But the extent of that rise depends on where the economy is operating relative to its capacity. When the economy is operating below its full-employment output, it has large amounts of unused machinery and equipment and large numbers of unemployed workers. Firms can put these idle human and property resources back to work with little upward pressure on per-unit production costs. And as output expands, few if any shortages of inputs or production bottlenecks will arise to raise per-unit production costs. That is why the slope of the short-run aggregate supply curve increases only slowly at output levels below the full-employment output level Q_f.

On the other hand, when the economy is operating beyond Q_f, the vast majority of its available resources are already employed. Adding more workers to a relatively fixed number of highly used capital resources such as plant and equipment creates congestion in the workplace and reduces the efficiency (on average) of workers. Adding more capital, given the limited number of available workers, leaves equipment idle and reduces the efficiency of capital. Adding more land resources when capital and labor are highly constrained reduces the efficiency of land resources. Under these circumstances, total input costs rise more rapidly than total output. The result is rapidly rising per-unit production costs that give the short-run aggregate supply curve its rapidly increasing slope at output levels beyond Q_f.

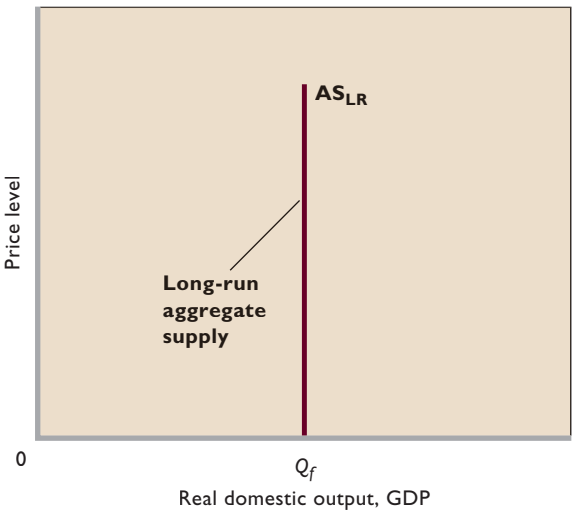
Aggregate Supply in the Long Run

In macroeconomics, the long run is the time horizon over which both input prices as well as output prices are flexible. It begins after the short run ends. Depending on the type of firm and industry, this may be from a couple of weeks to several years in the future. But for the economy as a whole, it is the time horizon over which all output and input prices—including wage rates—are fully flexible.

The **long-run aggregate supply curve** AS_{LR} is vertical at the economy's full-employment output Q_f, as shown in Figure 29.5. The vertical curve means that in the long run the economy will produce the full-employment output level no matter what the price level is. How can this be? Shouldn't higher prices cause firms to increase output? The explanation lies in the fact that in the long run when both input prices as well as output prices are flexible, profit levels will always adjust so as to give firms exactly the right profit incentive to produce exactly the full-employment output level, Q_f.

To see why this is true, look back at the short-run aggregate supply curve AS shown in Figure 29.4. Suppose that the economy starts out producing at the full-employment output level Q_f and that the price level at that moment has an index value of 100. Now suppose that output prices double, so that the price index goes to 200. We

FIGURE 29.5 Aggregate supply in the long run. The long-run aggregate supply curve AS_{LR} is vertical at the full-employment level of real GDP (Q_f) because in the long run wages and other input prices rise and fall to match changes in the price level. So price-level changes do not affect firms' profits and thus they create no incentive for firms to alter their output.



previously demonstrated for our single-firm economy that this doubling of the price level would cause profits to rise in the short run and that the higher profits would motivate the firm to increase output.

This outcome, however, is totally dependent upon the fact that input prices are fixed in the short run. Consider what will happen in the long run when they are free to change. Firms can only produce beyond the full-employment output level by running factories and businesses at extremely high rates. This creates a great deal of demand for the economy's limited supply of productive resources. In particular, labor is in great demand because the only way to produce beyond full employment is if workers are working overtime.

As time passes and input prices are free to change, the high demand will start to raise input prices. In particular, overworked employees will demand and receive raises as employers scramble to deal with the labor shortages that arise when the economy is producing at above its full-employment output level. As input prices increase, firm profits will begin to fall. And as they decline, so does the motive firms have to produce more than the full-employment output level. This process of rising input prices and falling profits continues until the rise in input prices exactly matches the initial change in output prices (in our example, they both double). When that happens, firm profits in real terms return to their original level so that firms are once again motivated to produce at exactly the full-employment output level. This adjustment process means that in the long run the economy will produce at full employment regardless of the price level (in our example, at either $P = 100$ or $P = 200$). That is why the long-run aggregate supply curve AS_{LR} is vertical above the full-employment output level. Every possible price level on the vertical axis is associated with the economy producing at the full-employment output level in the long run once input prices adjust to exactly match changes in output prices.

Focusing on the Short Run

The immediate-short-run aggregate supply curve, the short-run aggregate supply curve, and the long-run aggregate supply curve are all important. Each curve is appropriate to situations that match their respective assumptions about the flexibility of input and output prices. In the remainder of the book, we will have several different opportunities to refer to each curve. But our focus in the rest of this chapter and the several chapters that immediately follow will be on short-run aggregate supply curves, such as the AS curve shown in Figure 29.4. Indeed, unless explicitly stated otherwise, all references to "aggregate supply" are to the AS curve and to aggregate supply in the short run.

Our emphasis on the short-run aggregate supply curve AS stems from out interest in understanding the business cycle in the simplest possible way. It is a fact that real-world economies typically manifest simultaneous changes in both their price levels and their levels of real output. The upward-sloping short-run AS curve is the only version of aggregate supply that can handle simultaneous movements in both of these variables. By contrast, the price level is assumed fixed in the immediate-short-run version of aggregate supply illustrated in Figure 29.3 and the economy's output is always equal to the full-employment output level in the long-run version of aggregate supply shown in Figure 29.5. This renders these versions of the aggregate supply curve less useful as part of a core model for analyzing business cycles and demonstrating the short-run government policies designed to deal with them. In our current discussion, we will reserve use of the immediate short run and long run for specific, clearly identified situations. Later in the book we will explore how the short-run and long-run AS curves are linked, and how that linkage adds several additional insights about business cycles and policy.

Changes in Aggregate Supply

An existing aggregate supply curve identifies the relationship between the price level and real output, other things equal. But when one or more of these other things change, the curve itself shifts. The rightward shift of the curve from AS_1 to AS_2 in Figure 29.6 represents an increase in aggregate supply, indicating that firms are willing to produce and sell more real output at each price level. The leftward shift of the curve from AS_1 to AS_3 represents a decrease in aggregate supply. At each price level, firms produce less output than before.

Figure 29.6 lists the other things that cause a shift of the aggregate supply curve. Called the **determinants of aggregate supply** or *aggregate supply shifters*, they collectively position the aggregate supply curve and shift the curve when they change. Changes in these determinants raise or lower per-unit production costs *at each price level (or each level of output)*. These changes in per-unit production cost affect profits, thereby leading firms to alter the amount of output they are willing to produce *at each price level*. For example, firms may collectively offer $9 trillion of real output at a price level of 1.0 (100 in index value), rather than $8.8 trillion. Or they may offer $7.5 trillion rather than $8 trillion. The point is that when one of the determinants listed in Figure 29.6 changes, the aggregate supply curve shifts to the right or left. Changes that reduce per-unit production costs shift the aggregate supply curve to the right, as from AS_1 to AS_2; changes that increase per-unit production costs shift it